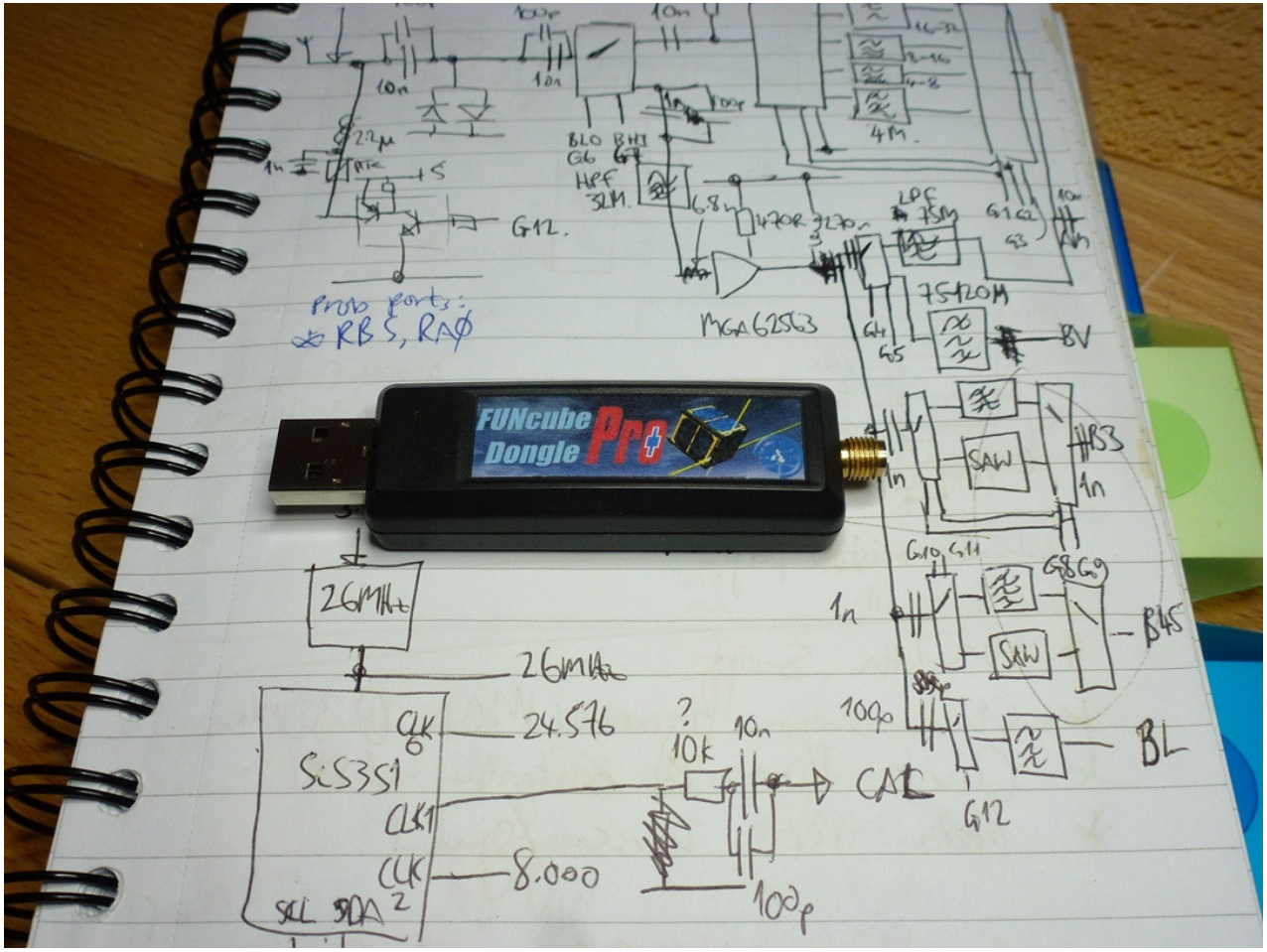
FUNcube Dongle Pro+

DC-to-daylight software-defined radio

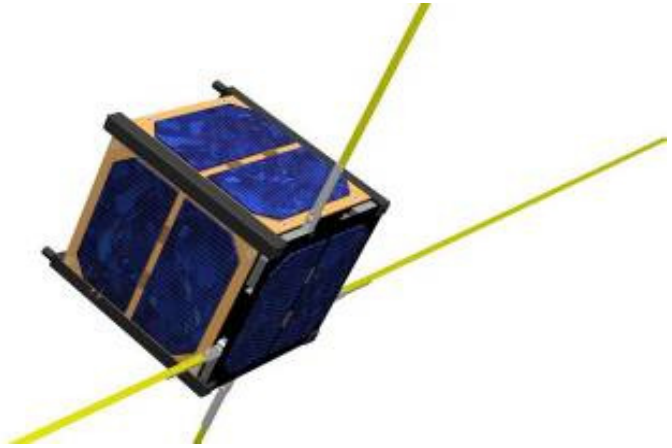


This wasn't meant to happen!

- The original FCD was still selling well
- Working on SDR for mobile devices
- Then a chip supply problem
- In July 2012, we ran out of parts
- But we have a satellite to launch…
- …and no groundstation!

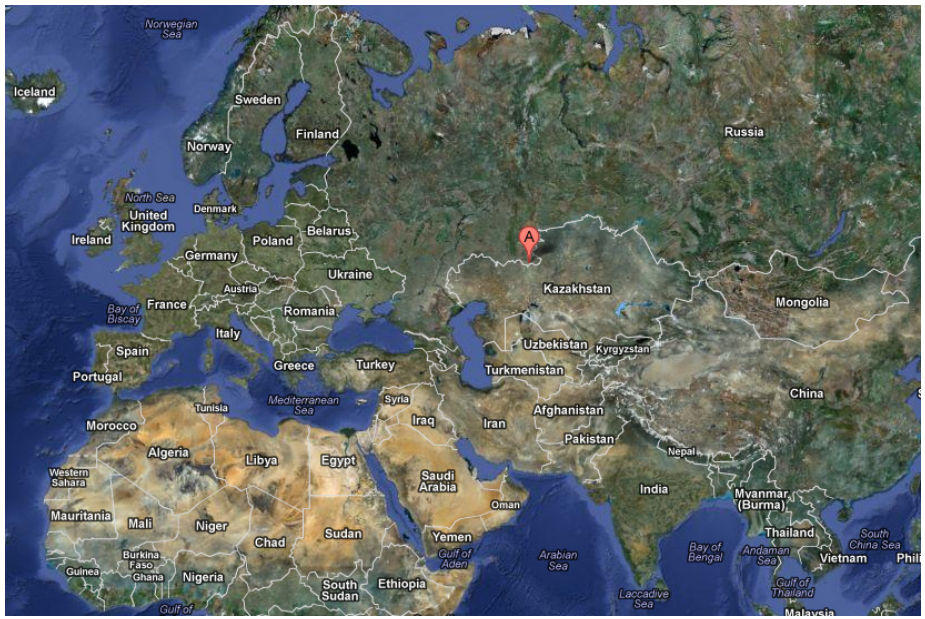
Take a step back: the FUNcube project

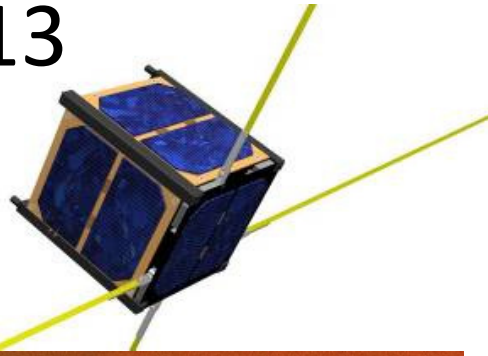
- The FUNcube project is a satellite designed to enthuse young people in Science, Technology, Engineering and Maths
- First and foremost, the FUNcube Dongle is the ground receiver for the FUNcube satellite.
- Everything else is secondary!



FUNcube-1 satellite status

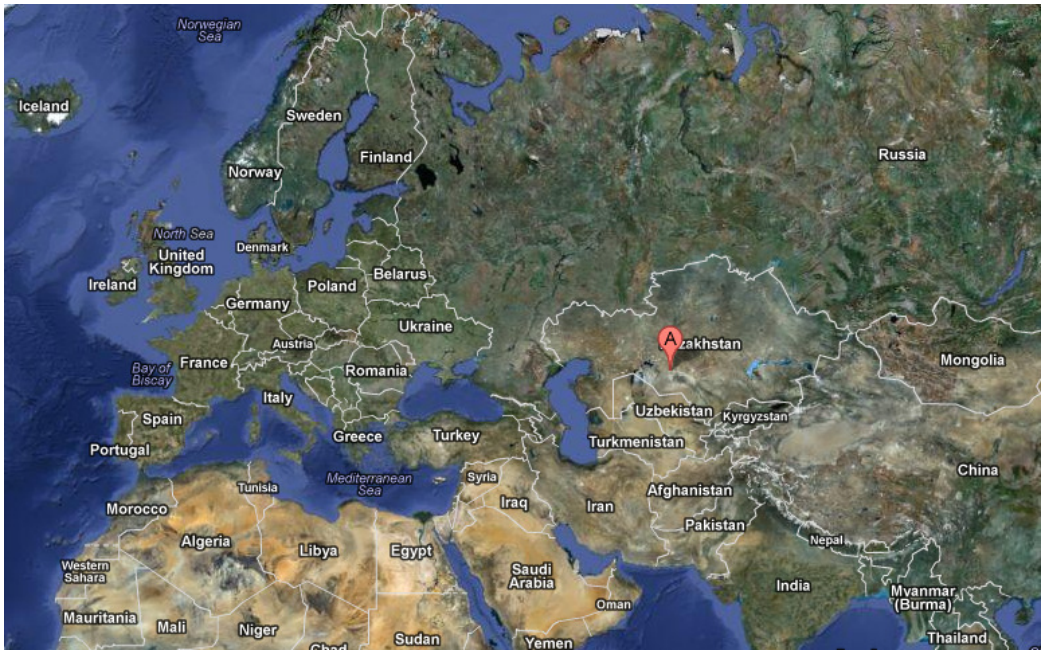
- Flight model completed
- Includes a 70cm/2m linear transponder
- Shake & vac tests imminent, October 2012
- Launch delayed until March/April 2013
- DNEPR launch from Yasny

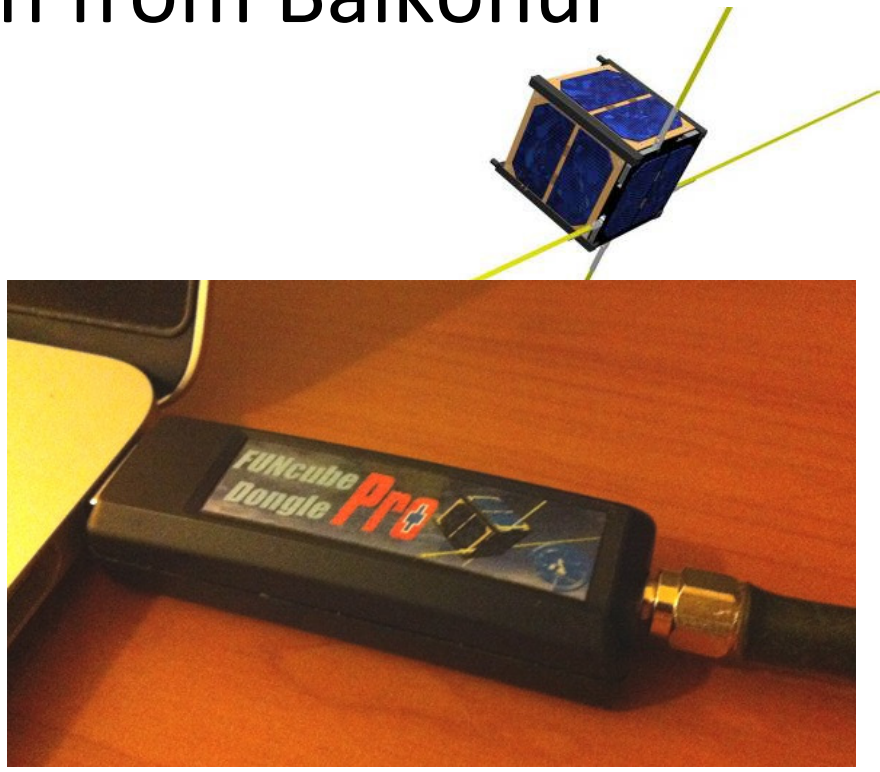




FUNcube-2 satellite status

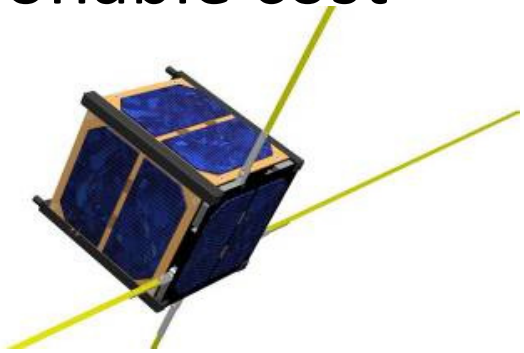
- We're also on-board the UK Space Agency's UKube-1 project
- Same payloads as FUNcube-1
- Soyuz-2 March 2013 Launch from Baikonur





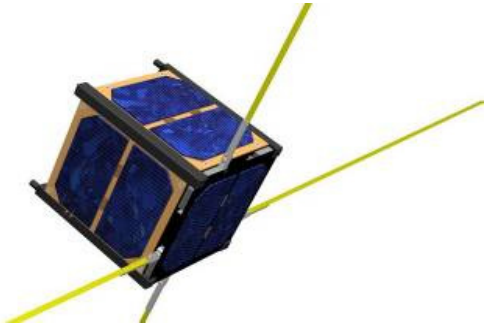
Aims of the FUNcube Dongle

- Groundstation receiver for FUNcube
- Primary design requirements:
  - Accessible, not intimidating
    - For **everyone**, amateur and non-amateur
  - A true turnkey solution
    - Zero hardware setup
    - Plug in and go
  - Reasonable cost



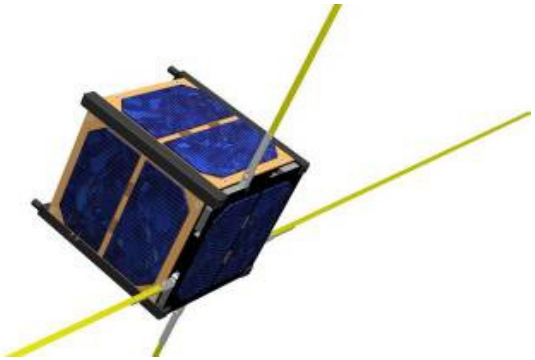
FUNcube Dongle status

- FCD Pro still selling well, until mid-July 2012 when stock exhausted
- Difficulties in supply of the tuner chip
- Stock definitely exists, and in some quantity!
- Small quantities are available but too expensive to make a viable production run
- Tuner chip will become available soon, but still little indication of exactly wh



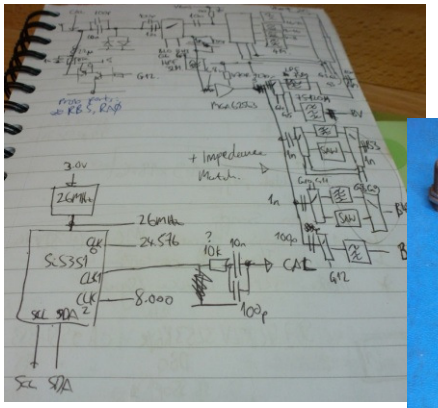
FUNcube Dongle next steps

- We have a satellite launch very soon, but possibly no ground segment
- To mitigate risk, we decide to develop a replacement FCD
- We also decide to improve the FCD
  - Better performance
  - More features

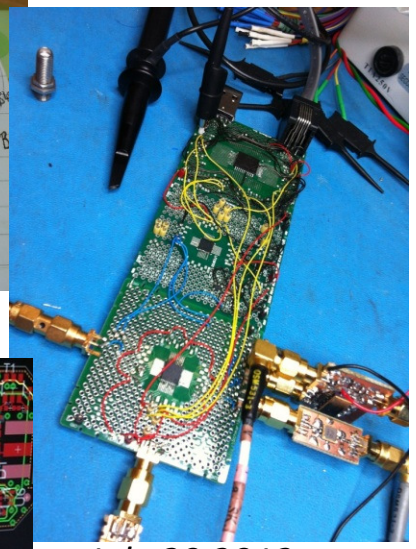


FCD Pro+ development timeline

- Mid June 2012
  - Decision taken to build new FCD
  - Parts evaluation starts
- July 2012
  - Principal parts chosen
  - Extensive unit testing
  - Breadboarded prototype
- August 2012
  - Further unit testing continues
  - Two PCB spins
  - Final design accomplished
- September 2012
  - Production run starts
  - Online shop developed: *** **pre-ordering now taken!** ***
- October 2012
  - CE/FCC conformance testing
  - First units available



July 29 2012



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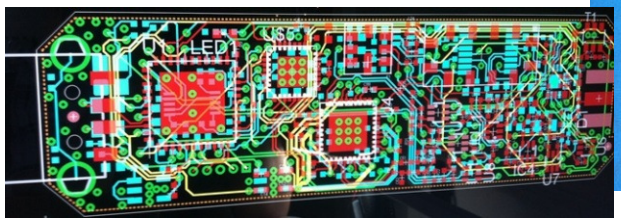
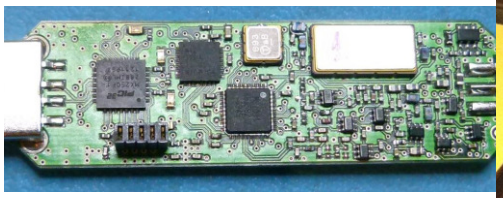


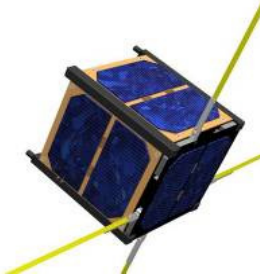
8 August 2012



28 August 2012

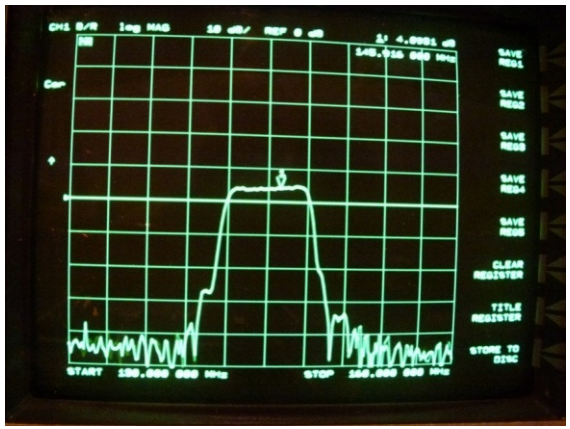
3 September 2012, 5:00pm

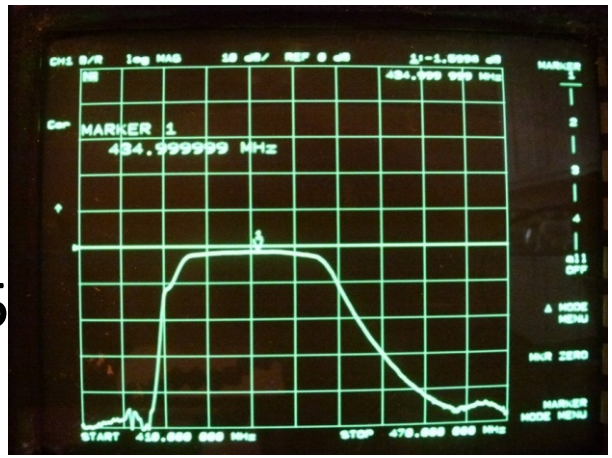
3 September 2012, 5:01pm

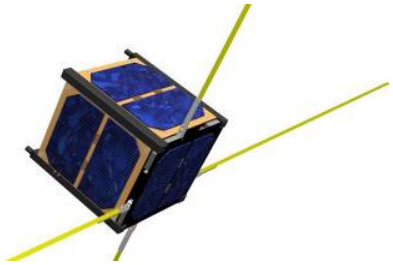


FUNcube Dongle Pro+
Performance Improvements

- Improved dynamic range
  - 3.3v tuner RF section instead of 1.5v
  - LNA OIP3 30dBm (was 10dBm)
  - Better tuner/ADC noise floor
- Excellent frequency stability and accuracy
  - 0.5ppm TCXO
- 24 bit internal ADC depth
- 11 front end hardware filters
  - Including SAW filters for 145MHz and 435 MHz
- Improved LO phase noise

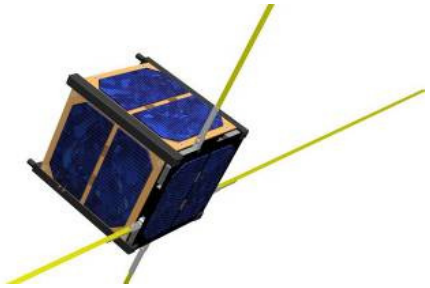






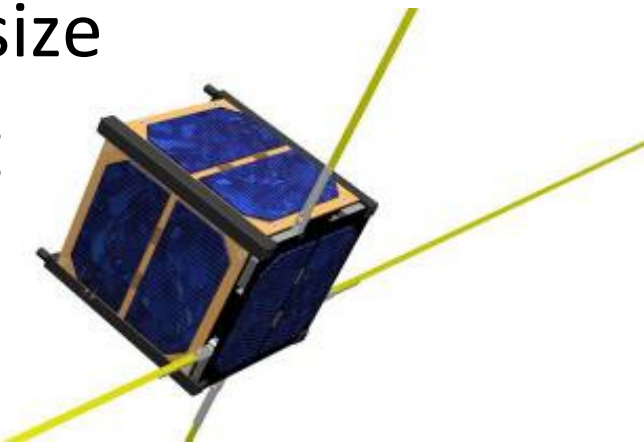
FUNcube Dongle Pro+
Functionality Improvements

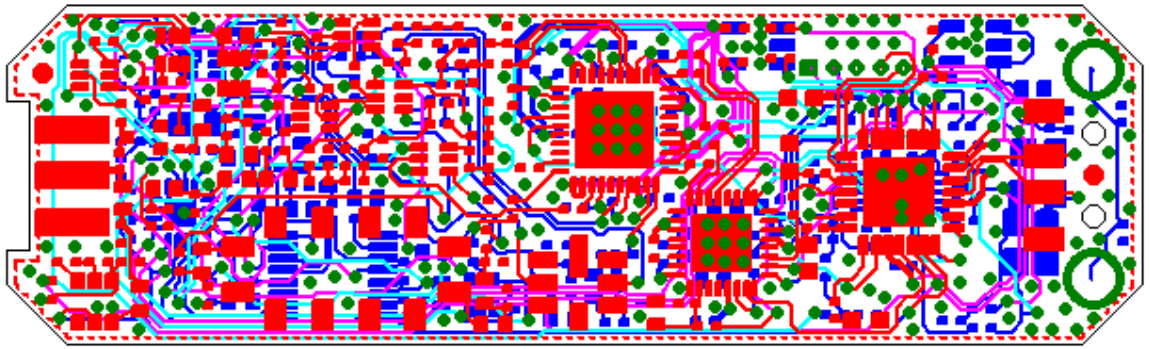
- 192kHz sample rate
- Tuner PLL steps <0.5Hz
- Frequency coverage
- 4m, 2m, 1.25m, 70cm, 33cm, 23cm
- 6m
- 160m-10m
- LF, MF
- 150kHz-250MHz & 420MHz-2GHZ



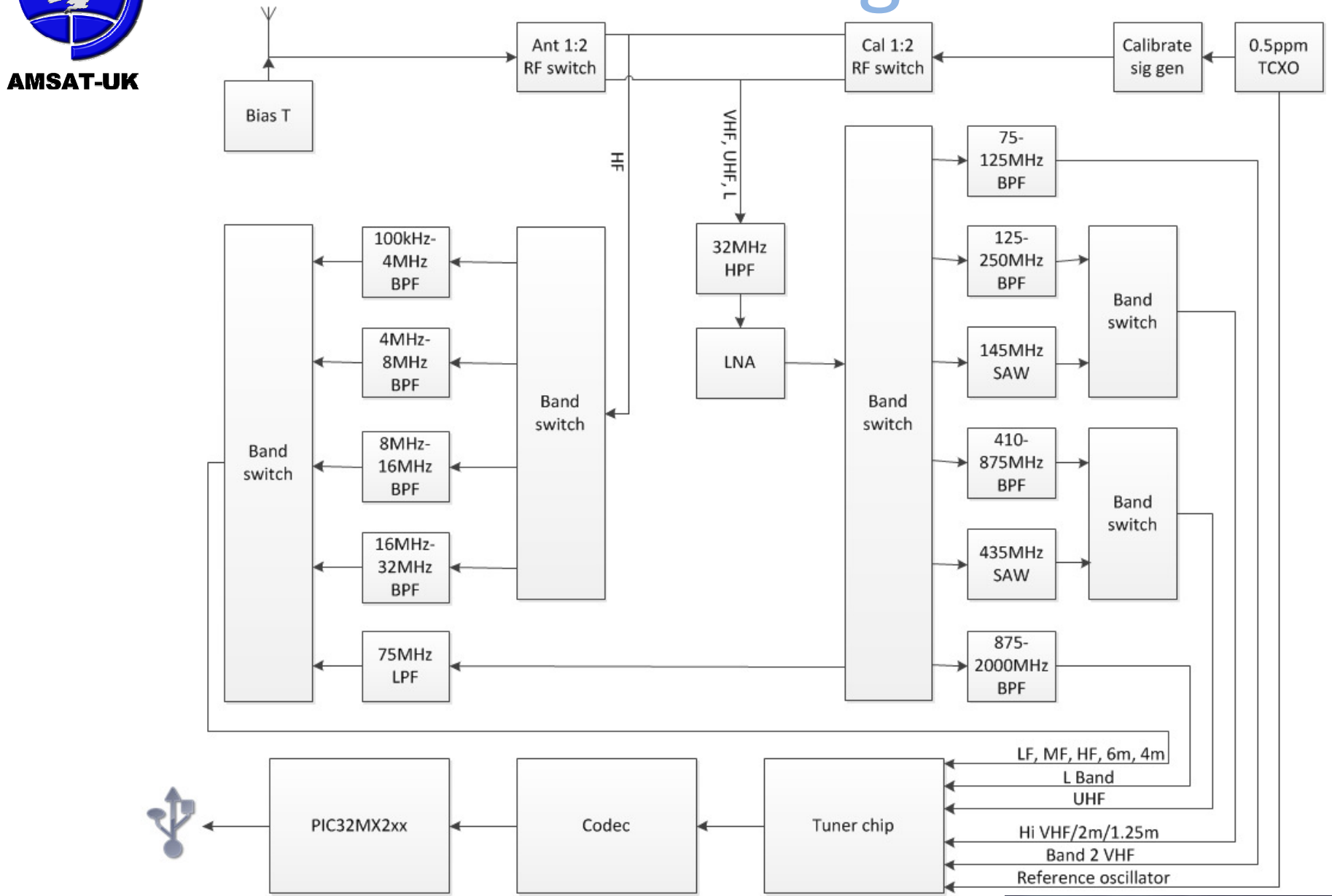
FUNcube Dongle Pro+

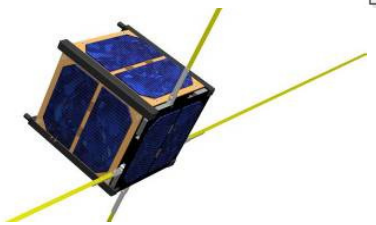
- Extensively unit tested: about 20 different PCBs for LNAs, filters and band switches
  - Careful attention paid to parts
  - eg, inductors WW or multilayer, Q, size
- 2 full breadboard prototypes built
- Now 240 components, was 100
- Parts on top and bottom of board
- Six-layer board





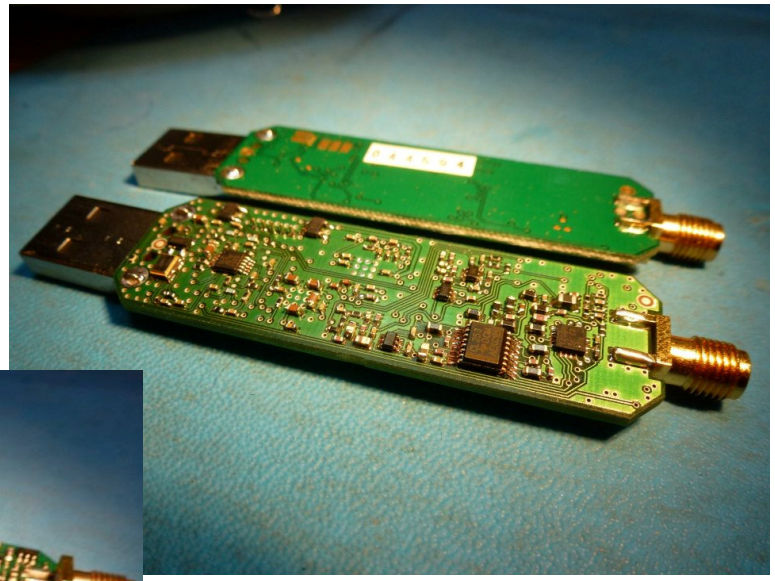
FUNcube Dongle Pro+

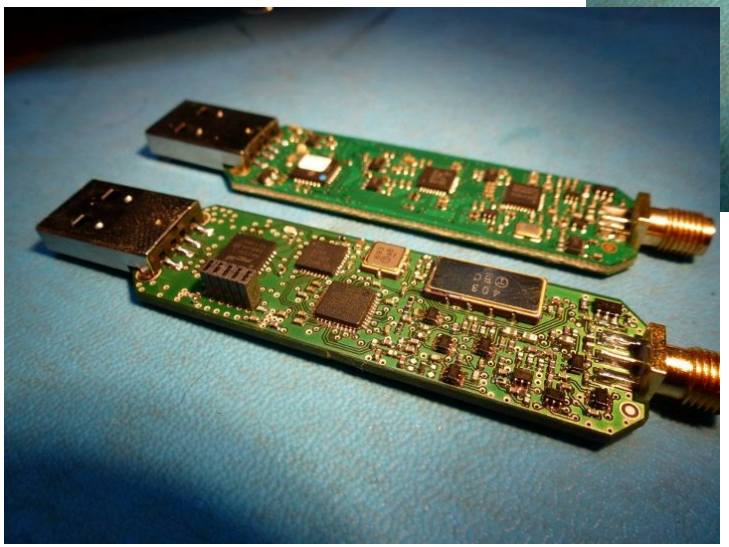


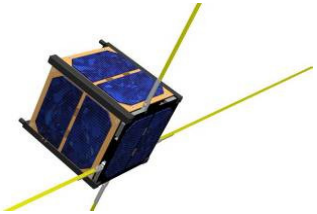


FUNcube Dongle Pro+

- Manufactured in UK!
- Continues to help to fund the FUNcube satellite
- Pricing for your DC-daylight FCD Pro+
- £124.99+VAT
  - USD $199
  - EUR €156+VAT
  - CAD $195
  - AUD $194
  - JPY ¥15660







FUNcube Dongle Pro+

- Thank you!
  - Howard G6LVB, g6lvb@amsat.org
  - Pre-order here:
  - http://www.funcubedongle.com